Comparative Review of *Applied Linear Algebra*, 3rd Ed., by B. Noble and J. W. Daniel* and *Linear Algebra and Its Applications*, 3rd Ed., by G. Strang†

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Both of the books under review here are well-established texts, the first having originally appeared nearly twenty years ago and the second over ten years ago. It is therefore not easy to read them with an unbiased mind. However, I have tried to do so, and the result has been a fascinating comparison of styles.

For those who do not know these texts, I should begin by summarizing their contents, which are very similar. They both include the material normally covered in introductory books on linear algebra and so are competing with the ever-growing list of texts, such as [1–5], many also having appeared in several editions. However, both Noble and Daniel and Strang include more advanced topics such as orthogonality and norms and important numerical techniques such as QR factorization, singular value decomposition, and discrete Fourier transforms. In addition they both discuss some applications of linear algebra, namely difference and differential equations, matrix exponentials, and linear programming, including the new Karmarkar methods. Strang also has sections on graphs and networks, finite elements, and game theory. There are a large number of examples of varying standards in both books. Noble and Daniel include some specifically designed for use with MATLAB [6], while Strang includes an appendix on computer codes. Both books contain a bibliography, that in Noble and Daniel being more comprehensive.

For those readers familiar with the second editions, the major differences in Strang are in the organization of the first chapter on linear equations, the incorporation of the section on linear transformations into the main text, and

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the addition of an appendix on singular value decomposition and pseudo-inverses. The main difference in Noble and Daniel is the inclusion of the examples using MATLAB, and they also claim that the style has been made more consistent.

Both texts are very well written, with very few errors in the printing. One minor criticism is that the diagrams involving three dimensional space are rather unclear, especially in Strang, and would be improved by some sort of shading as in [1].

So far, everything that has been said has been of similarities between the books. Where they differ completely is in the style of the text. This can be illustrated very easily by quoting the first few words of each preface:

Linear algebra is a fantastic subject.—Strang

Linear algebra is an essential part of the mathematical toolkit,....—Noble and Daniel.

Throughout Strang, there is an enormous enthusiasm which is communicated to the reader, occasionally almost to excess, and indeed, the author almost seems to be speaking to the reader. Noble and Daniel is certainly not dull, but it is written very much like many other textbooks: clear, easy to read, but rather anonymous. I hasten to add that I do not consider this as a criticism and many readers will prefer it.

Having read both books carefully, I have to say that both are highly recommendable, both as elementary texts and for deeper courses in linear algebra; but they may not both appeal to the same student.

One of the techniques used by Strang is to explain ideas from several different points of view at the same time. Clearly this is stimulating for anyone capable of understanding these subtleties, but could well confuse a weaker student. For this reason it is probably safer for such a student to be recommended Noble and Daniel, at least to begin with.

In a large field of possible texts, many of which are excellent, I personally would not want to be without either of these fine books.

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